PHYSICS NMDCAT

TOPIC WISE TEST (UNIT–11)

TOPICS:

✓ **Atomic Spectra and Nuclear Physics**

Q.1 **The Balmer series for hydrogen atom corresponds to electronic transitions that terminate in the state of quantum number n = 2. The longest wavelength of photon emitted is**

A. $\frac{5R}{36}$ B. $\frac{36}{5R}$

C. $\frac{36}{5}$ D. $\frac{5}{36}$

Q.2 **Shortest wavelength photon in the Balmer series is**

A. $\frac{4}{R}$ B. $\frac{R}{4}$

C. $\frac{1}{4}$ D. 4

Q.3 **The wavelength of last spectral line in Lyman series in of Rydberg constant is**

A. R B. R^2

C. $\frac{1}{R}$ D. $\frac{1}{R^2}$

Q.4 **Tick the series lies in infra-red region:**

A. Paschen series B. Pfund series

C. Brackett series D. All of the above

Q.5 **In the general formula in which all the series of hydrogen spectrum is given by:**

A. $\lambda = R_H\left(\frac{1}{p^2}-\frac{1}{n^2}\right)$ B. $\lambda = \frac{1}{R_H}\left(\frac{1}{p^2}-\frac{1}{n^2}\right)$

C. $\frac{1}{\lambda} = R_H\left(\frac{1}{p^2}-\frac{1}{n^2}\right)$ D. $\lambda = R_H\left(\frac{1}{p^2}-\frac{1}{n^2}\right)$

Q.6 **The radiations emitted from hydrogen filled discharge tube shows:**

A. Continuous spectrum B. Band spectrum

C. Line spectrum D. None of these

Q.7 **The spectral series that contains transitions terminating on the ground level of hydrogen is called:**

A. Paschen series B. Balmer series

C. Pfund series D. Lyman series

Q.8 **The equation of Rydberg constant is given by:**

A. $R_H = \frac{h_o}{m^o}$ B. $R_H = \frac{E_o}{\lambda}$

C. $R_H = \frac{E_o}{hc}$ D. $R_H = \frac{1}{he}$

Q.9 **Which of the following series of H-Spectrum lies in ultraviolet region:**

A. Lyman series B. Paschen series

C. Balmer series D. Bracket series

Q.10 **Paschen series is obtained when all the transitions of electron terminate on.**

A. 2^{nd} orbit B. 4^{th} orbit

C. 3^{rd} orbit D. 5^{th} orbit

Q.11 **The relation for paschen series is given as**

A. $\frac{1}{\lambda} = R_H\left(\frac{1}{2^2}-\frac{1}{n^2}\right)$ B. $\frac{1}{\lambda} = R_H\left(\frac{1}{4^2}-\frac{1}{n^2}\right)$

C. $\frac{1}{\lambda} = R_H\left(\frac{1}{3^2}-\frac{1}{n^2}\right)$ D. $\frac{1}{\lambda} = R_H\left(\frac{1}{5^2}-\frac{1}{n^2}\right)$

Q.12 **If the radioactive substance reduces to $\frac{1}{16}$ of its original mass in 40 days then its half-life is**

A. 10 days
B. 40 days
C. 20 days
D. 4 days

Q.13 **1 micro Curie of radioactivity is equal to**

A. 1 micro Becquerel
B. 3.7×10^7 Becquerel
C. 3.7×10^2 Becquerel
D. 3.7×10^4 Becquerel

Q.14 **Due to emission of $\beta^+ - rays$**

A. Mass of the Nucleus Increases
B. Charge on the Nucleus Increases
C. Mass of the Nucleus Decreases
D. Charge number Decreases

Q.15 **A Radioactive Isotope $^{238}_{92}U$ decays consecutively to $^{234}_{92}U$ the particles emitted are**

A. One α and one β
B. One α and two β
C. Two α and one β
D. Two α and two β

Q.16 **The decay constant λ of a radioactive sample is the probability of decay of an atom in unit time:**

A. λ decreases as the atoms become older
B. λ is independent of the age of atoms
C. λ increases as the age of atoms increases
D. None of these

Q.17 **In which sequence the radioactive radiations are emitted in the following nuclear reaction?**

$$X_Z^A \rightarrow Y_{\beta+1}^A \rightarrow K_{Z-1}^{\alpha-4} \rightarrow K_{Z-1}^{A-4}$$

A. α, β and γ
B. β, α and γ
C. β, γ and α
D. γ, α and β

Q.18 **A count rate 240 per minute reduce to 30 counts per min in 1 hour. The half-life of source is**

A. 20 min
B. 80 min
C. 30 min
D. 100 min

Q.19 **In an α-decay**

A. The parent and daughter nuclei have same number of protons
B. The daughter nucleus has two protons less than parent nucleus
C. The daughter nucleus has one proton more than parent nucleus
D. The daughter nucleus has two neutrons more than parent nucleus

Q.20 **A thorium nucleus is formed when a uranium nucleus emits an α-particle. Atomic number of thorium is**

A. 92
B. 90
C. 82
D. 94

Q.21 **The radioactive nuclide $_{86}Ra^{228}$ decays by series of emission of three α-particle and one β- particle, the nuclei X finally formed is**

A. $_{84}X^{220}$
B. $_{86}X^{222}$
C. $_{83}X^{216}$
D. $_{88}X^{215}$

Q.22 **γ- radiation are emitted due to**

A. De-excitation of atom
B. De-excitation of nucleus
C. Excitation of atom
D. Excitation of nucleus

Q.23 **Absorbed dose is defined as**

A. D = E/m
B. D = m/ E
C. D = Em
D. D = 1/mE

Q.24 **Gamma rays are**

A. Singly ionized gas atoms
B. Fast moving electrons
C. Helium nuclei
D. Electromagnetic waves

Q.25 **Half-life of radon gas is**

A. 1620years
B. 23.5 minutes
C. 3.8 days
D. 4.5×10^9years

Q.26 **One reaction which might be used for controlled nuclear fusion is shown.**

$$^7_3\text{Li} + ^2_1\text{H} \rightarrow 2\left(^4_2\text{He}\right) + \text{X}$$

What is particle X?

A. An α-particle
B. A neutron
C. An electron
D. A proton

Q.27 Cancerous tissue in a thyroid gland can be detected by the intake of

A. Radio iodine
B. Radio carbon
C. Radio sodium
D. Radio phosphors

Q.28 During radioactive series parent nucleus is $^{232}_{94}X$ and last daughter nucleus is $^{208}_{84}Y$. How many α and β-particles are emitted during this change

A. 6α, 3β
B. 4α, 4β
C. 6α, 2β
D. 4α, 6β

Q.29 Which of given is correct relation for measuring the value of decay constant.

A. $\lambda = -\frac{\Delta N}{N\Delta t}$
B. $\lambda = \frac{\Delta N \Delta t}{N}$
C. $\lambda = \frac{N}{\Delta N \Delta t}$
D. $\lambda = \frac{N\Delta N}{\Delta t}$

Q.30 1 Sv =

A. 1 Gy x RBE
B. 1 Gy/RBE
C. 2 Gy x RBE
D. RBE/1 Gy

Q.31 The half-life of ^{210}Bi is 5 days, if we start with 50, 000 atoms of this isotopes, the number of atoms left over after 10 days is

A. 50,000
B. 25,000
C. 12,500
D. 20,000

Q.32 During nuclear changes which of the following laws remain applicable

A. Law of conservation of energy
B. Law of conservation of momentum
C. Law of conservation of mass
D. All of these

Q.33 Doses of _____ will cause radiation burns to the skin

A. 2Sv
B. 4Sv
C. 3Sv
D. 5Sv

Q.34 What is the half-life Iodine I-125?

A. 2 weeks
B. 8 days
C. 1-week
D. 10 days

Q.35 The rate of decay of radioactive element at a given instant of time is 10^3 disintegration/seconD. If the half-life of this element is 1 second, then the rate of decay after 2 second will be

A. 12 disintegration per sec
B. 500 disintegration per sec
C. 250 disintegration per sec
D. 125 disintegration per sec

Q.36 Thorium is transformed after the emission of β-particle into

A. Bismuth
B. Polonium
C. Protactinium
D. Palladium

Q.37 The value of A in the following reaction is

$$_4Be^9 + {}_2He^4 = {}_6C^A + {}_6n^1$$

A. 14
B. 10
C. 12
D. 16

Q.38 The relationship between decay constant λ and half-life $T_{1/2}$ of the radioactive substance is

A. $\lambda T_{1/2} = \ell n(2)$
B. $\lambda T_{1/2} = \ell n\left(\frac{1}{2}\right)$
C. $\frac{\lambda}{T_{1/2}} = \ell n(2)$
D. $\lambda = \ell n(2)$

Q.39 Ten grams of ^{57}Co kept in an open container beta-decays with a half-life of 270 days. The weight of the material inside the container after 540 days will be very nearly

A. 10 g
B. 2.5 g
C. 5 g
D. 1.25 g

Q.40 The following represents a sequence of radioactive decays involving two α-particles and one β particle.

$$^{217}_{85}At \xrightarrow{\alpha} V \xrightarrow{\alpha} W \xrightarrow{\beta} X$$

A. $^{213}_{85}At$
B. $^{209}_{82}Pb$
C. $^{215}_{77}lr$
D. $^{217}_{81}Tl$

Q.41 The percentage of the original of a radioactive material left after five half-lives is approximately:

A. 1% B. 3%
C. 5% D. 20%

Q.42 If 20 g of a radioactive substance reduces to 10 g in 4 minutes, then in what time will 80 g of the same substance reduce to 10 g?

A. 8 min B. 12 min
C. 16 min D. 20 min

Q.43 Different radioactive materials have

A. Same half-life B. Different half life
C. Same total life D. Both b & c

Q.44 The unit of decay constant is:

A. sec B. sec^{-3}
C. sec^{-2} D. sec^{-1}

Q.45 An atom with mass number A_1 converts into another with mass number A_2 after radioactive decay. The correct statement is

A. A_2 can never be equal to A_1
B. The value of A_2 will not be more than that of A_1
C. The value A_1 will be less than A_2
D. The value of A_1 will not be more than that of A_2

Q.46 cobalt-60 is used for treatment of

A. Cancer B. Kidneys
C. Lungs D. Thyroid

Q.47 The radioactivity of a nucleus becomes 1/64 of its initial value in 60 seconds. The half-life of nuclide is

A. 5 s B. 10 s
C. 20 s D. 30 s

Q.48 What is the absorbed dose D of a sample of 2 kg which is given an amount of 100 J of radioactive energy?

A. 200 Gy B. 50 Gy
C. 102 Gy D. 98 Gy

Q.49 There is no change in A and Z of any radioactive element by the emission of

A. α-particle B. γ-particle
C. β-particle D. X-rays

Q.50 $^{90}_{38}Sr$ decays to $^{90}_{39}Y$ by

A. Emission of α-particles B. Emission of β-particles
C. Emission of 1α and 2β particles D. Absorption of electrons

Q.51 A radioactive substance is at t=0, the number of atoms is 8×10^4. Its half-life period is 3 years. The number of atoms 1×10^4 will remain after interval

A. 19 years B. 24 years
C. 9 years D. 6 years

Q.52 The decay constant of radium is 4.28×10^{-4} per year. Its half-life will be

A. 1240 years B. 2000 years
C. 1620 years D. 63 years

Q.53 A sample contains 16 gm of a radioactive material, the half-life of which is two days. After 32 days, the amount of radioactive material left in the sample is

A. 14gm B. less than 1 mg
C. 12gm D. 1gm

Q.54 Half-life of a radioactive substance is T. The time taken for all the nuclei to disintegrate will be

A. 2T B. Infinite
C. 4T D. T^2

Q.55 The decay constant λ of the radioactive sample is the probability of decay of an atom in unit time, then

A. λ decreases as atoms become older
B. λ increases as the age of atoms increases
C. λ is independent of the age
D. Behaviour of λ with time depends on the nature of the activity

Q.56 The half-life of a radioactive element which has only 1/32 of its original mass left after a lapse of 60 days is

A. 12 days
B. 32 days
C. 60 days
D. 64 days

Q.57 A radioactive nucleus undergoes a series of decay according to the scheme $A \xrightarrow{\alpha} A_1 \xrightarrow{\beta} A_2 \xrightarrow{\alpha} A_3 \xrightarrow{\gamma} A_4$**. If the mass number and atomic number of A are 180 and 72 respectively, then what are these number for A_4**

A. 172 and 69
B. 174 and 70
C. 176 and 69
D. 176 and 70

Q.58 Radioactivity is

A) Irreversible process
B) Spontaneous process
c) Self disintegration process
D) All of the above

Q.59 The half-life of polonium is 140 days. After how many days, 16 gm polonium will be reduced to 1 gm (or 15g will decay)

A. 700 days
B. 280 days
C. 560 days
D. 420 days

Q.60 What is the respective number of α and β particles emitted in the following radioactive decay $_{90}X^{200} \rightarrow {}_{80}Y^{168}$

A. 6 and 8
B. 8 and 8
C. 6 and 6
D. 8 and 6

CTS # 11

Chemistry

1- D	11- B	21- A	31- B	41- D
2- B	12- C	22- A	32- D	42- D
3- C	13- C	23- A	33- B	43- A
4- D	14- C	24- C	34- A	44- D
5- B	15- D	25- B	35- C	45- D
6- C	16- B	26- B	36- A	46- A
7- C	17- D	27- C	37- D	47- A
8- C	18- C	28- A	38- C	48- C
9- C	19- C	29- B	39- B	49- A
10- B	20- B	30- D	40- D	50- B

Physics

1- B	11- A	21- C (Z=81)	31- C	41- B	51- C
2- A	12- D	22- B	32- D	42- B	52- C
3- C	13- D	23- A	33- C	43- D	53- B (gm)
4- D	14- B	24- D	34- 60 days	44- D	54- B
5- C	15- B	25- C	35- C	45- B	55- C
6- C	16- B	26- B	36- C	46- A	56- A
7- D	17- B	27- A	37- C	47- B	57- A
8- C	18- A	28- C	38- A	48- B	58- D
9- A	19- B	29- A	39- B	49- B	59- C
10- C	20- B	30- A	40- B	50- B	60- D
					61- C, D